إجابات المسائل

4) $I = 5mA \times 10^{-3} = 5 \times 10^{-3} A$

$t = 10\ sec$, $e = 1.6 \times 10^{-19} C$

$Q = I.t = N.e \rightarrow N = \frac{It}{e}$

$N = \frac{5 \times 10^{-3} \times 10}{1.6 \times 10^{-19}} = 3.125 \times 10^{17} e$

5) $I = \frac{n.e}{t} = \frac{6.6 \times 10^{15} \times 1.6 \times 10^{-19}}{1} = 1.056 \times 10^{-3} A$

7) $V = \frac{W}{Q} = \frac{64}{8} = 8V$

21) $R = \rho_e \frac{L}{A} = \frac{1 \times \frac{1}{4}}{4} = \frac{1}{16}$

$A = \pi r^2 \rightarrow R_2 = \frac{1}{16} R_1 = \frac{1}{16} \times 4 = \frac{1}{4} \Omega$

22) $R = \rho_e \frac{L}{A}$ (y / x)

Slope = $\rho_e L$

Slope = $\tan \theta$

$\tan \theta_1 > \tan \theta_2 > \tan \theta_3$

$slope_1 > slope_2 > slope_3$

$\rho_{e_1} > \rho_{e_2} > \rho_{e_3}$

$\sigma_3 > \sigma_2 > \sigma_1$

24) $\rho_e = \frac{RA}{L}$

$$\frac{\rho_{e_1}}{\rho_{e_2}} = \frac{R_1 A_1 L_2}{R_2 A_2 L_1} = \frac{1\times 2^2 \times 1}{1\times 1^2 \times 1} = \frac{4}{2} = \frac{2}{1}$$

25) $A = \frac{\rho_e L}{R}$

$$\frac{A_A}{A_B} = \frac{\rho_e L_A R_B}{\rho_{eB} L_B R_A} \rightarrow \frac{\pi\times\left(4\times 10^{-3}\right)^2}{A_B} = \frac{2\times 1}{1\times 8}$$

$$A_B = \frac{8\times\pi\times\left(4\times 10^{-3}\right)^2}{2} = 2\times 10^{-4}\ m^2$$

26) $R_3 = \rho_e \frac{L}{A} = \frac{1\times 4}{\frac{1}{4}} = 16\ \Omega$

$$R_2 = 16R_1 = 16\times 0.3 = 4.8\ \Omega$$

27) $\rho_e = \frac{RA}{L}$

$$\sigma = \frac{1}{\rho_e} = \frac{L}{RA} = \frac{1}{5\times 10^{-7}} = 2\times 10^6\ \Omega^{-1} m^{-1}$$

28) $R = \rho_e \frac{L}{A} = \frac{1\times 1.6}{\frac{1}{1.6}} = \frac{64}{25}$

29) $R = \rho_e \frac{L}{A} = \frac{1\times 1.2}{\frac{1}{1.2}}$

$$R_2 = 1.44R_1$$

مقدار الزيادة = $R_2 - R_1 = 1.44 - 1 = 0.44$

النسبة المئوية = $0.44\times 100 = 44\%$

30)

تظل ثابتة لأن المقاومة النوعية تتوقف على نوع المادة فقط ودرجة الحرارة.